



## BIKE HANDLE SECURING DEVICE FOR A COLLAPSIBLE BIKE FRAME

### BACKGROUND OF THE INVENTION

This invention relates to a device for securing a bike handle to a bike frame after the handle is separated from the bike frame, and particularly to a device which reduces packaging material for storing, positioning, and transporting a collapsible bike.

Bike manufacturers generally try to reduce transporting costs by increasing the number of bikes transported in a container by packaging the bike frames disassembled from the handles while combined with the brake lines and speed changing lines to reduce the size of package boxes. The consumers thereafter assemble the handle with the brake lines and the speed changing lines with the bike frame. This kind of packaging bikes is more popular for collapsible bikes, which are collapsed by bending a front frame on a rear frame or vice versa to reduce the size of the bikes to be packaged for transporting so that manufacturers may reduce the cost for package material and consumers may easily carry or store their bikes. However, even after a handle is separated from a bike frame and later combined with the frame for packing, there arises a problem that the handle with the vertical tube of a front fork tube may still require a large space. It is known to design a handle to be bendable to solve this problem, but this structure has the following disadvantages:

1. As for transporting, although the handle may be positioned flat on one side of the bike frame, the handle may collide with the frame and result in damage to the bike.
2. As for assembling, the frame and the handle are separated from each other, but are connected with some brake lines and speed changing lines, so consumers may forget to take out the frame together with the handle, and the handle may fall down on the ground or be pulled along the lines and become damaged.
3. As for collapsible bikes, the handle requires a bendable joint or a component for positioning in order to make the handle bendable and reduce the package size.
4. As for the collapsed condition, there is no stabilizing means for the collapsed

front frame and the collapsed rear frame in a package box, so the front frame and the rear frame may expand easily with the pivot joint as fulcrum, especially during transport by a user.

## SUMMARY OF THE INVENTION

This invention comprises a device for securing a bike handle after the handle is separated from a collapsible bike frame, in order to reduce its size for packaging, transporting and storing to help stabilize the collapsed bike.

The bike handle securing device includes a sidewise hollow fix tube, a hollow vertical rod of a handle which is sloped at its bottom end, a threaded rod inserted in the vertical rod from its top and with its bottom end extending out of the vertical rod, and a tightening member having a sloped upper surface to contact the sloped bottom end surface of the vertical rod and secured together with the threaded rod. The vertical rod and the tightening member are inserted in the fix tube, and the threaded rod is rotated to move the tightening member and the vertical rod, forcing the axis of the tightening member and that of the vertical rod out of alignment to permit the outer surfaces of the tightening member and the vertical rod to tightly engage the inner wall of the fix tube, thereby securing the handle on the bike frame.

## BRIEF DESCRIPTION OF THE DRAWINGS

This invention will be better understood by referring to the accompanying drawings, wherein:

Figure 1 is an exploded perspective view of a handle separated from a bike frame in the present invention;

Figure 2 is a partial enlarged view of Fig. 1;

Figure 3 is a cross-sectional view of the handle securing device in the present invention;

Figure 4 is a cross-sectional view of the handle securing device in the present invention, showing a different degree of tightening the handle;

Figure 5 is a perspective view of the handle securing device securing the handle on a collapsed bike frame in the present invention;

Figure 6 is a side view of the handle secured with the front fork of the bike frame in the present invention; and

Figure 7 is a partial enlarged cross-sectional view of Fig. 6.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A bike handle securing device for a bike frame in the present invention, as shown in Fig. 1, includes a vertical rod 41 of a handle 4 combined with a front fork tube of a front frame 1 of a bike, and a fix tube 21 fixed on a rear frame 2 of the bike.

The vertical rod 41 of the handle 4 is hollow, having a sloped bottom end surface, and a threaded rod 42 inserted through the vertical rod 41 from its top, as shown in Fig. 2. The threaded rod 42 has an upper end pivotally connected to an L-shaped operating rod 421, a bottom end protruding out of the bottom of the vertical rod 41, and a column-shaped tightening member 43 having an upper sloped surface to contact the sloped bottom end surface of the vertical rod 41, a center threaded hole to screw with the threaded rod 42, and plural lengthwise straight ribs 431 formed on a longer side wall for increasing friction, as shown in Fig. 3.

The fix tube 21 is secured in position on a rear frame of the bike, and having an inner diameter that is slightly larger than the diameter of the vertical rod 41, and an optional protective cover 211 for closing the outer end of the fix tube 21, as shown in Fig. 4.

In assembling, the bike handle securing device may have two kinds of assembled conditions, one for collapsing and the other for riding. First, if it is assembled for collapsing, referring to Figs. 3, 4 and 5, a collapsing joint 3 connecting the front frame 1 and the rear frame 2 is loosened to pivotally bend the front frame 1 and the rear frame 2 to each other, and then the vertical rod 41 together with the tightening member 43 is inserted in the fix tube 21 of the rear frame 2, as shown in Fig. 3. The operating rod 421 is then rotated and subsequently the threaded rod 42

together, forcing the tightening member 43 to move along the threaded rod 42 to the vertical rod 41, with the upper surface of the tightening member 43 rotating along the bottom end surface of the vertical rod 41 so that the tightening member may bias out of the same axis as that of the vertical rod 41, with the lengthwise straight ribs 431 of the tightening member 43 tightly engaging the inner wall of the fix tube 21 while the outer wall of the vertical rod 41 contrary to the straight ribs 431 pushes against the inner wall of the fix tube 21 to secure the handle 4 in the outer side of the fix tube 21, preventing debris from entering the fix tube 21. Thus the handle 4 is secured together with the collapsed bike frame as shown in Fig. 5. In addition, the upper end of the front fork tube 11 is open after the handle 4 is secured in the fix tube 21, so an upper cap 111 may be provided to close up the upper end of the front fork 11, as shown in Figs. 2 and 5.

As can be seen from Fig. 5, the vertical rod 41 is stabilized with the rear frame 2 when the handle 4 is secured in the fix tube 21, and the vertical rod 41 also pushes against the front frame 1, keeping the front frame 1 and the rear frame 2 in a stable position and preventing them from expanding, thus rendering the bike convenient to carry.

Next, as shown in Figs. 6 and 7, if a user wants to ride the bike, first separate the handle 4 from the fix tube 21, evolve the front frame 1 and the rear frame 2 with the collapsing joint 3 as a fulcrum and stabilize the joint 3, insert the vertical rod 41 of the handle 4 in the front fork tube 11, with the upper cap 111 removed. Then rotate the operating rod 421 together with the threaded rod 42, forcing the vertical rod 41 and the tightening member 43 to push against the inner wall of the front fork tube 11 tightly, as shown in Fig. 7. Lastly the operating rod 421 is pressed down to contact the front fork tube 11, as shown in Fig. 6, forming the bike in a position to ride. To collapse the bike after riding, fold the front frame 1 and the rear frame 2 to each other according to the process described above, and separate the handle 4 from the front fork tube 11 and rotate and insert the handle 4 in the fix tube 21 in the collapsed position shown in Figs. 4 and 5.

The bike handle securing device has several advantages.

1. In packaging and transporting, the handle 4 is secured on the rear frame, not assembled with the front fork tube 11, thus effectively reducing the size of the package box, and preventing damage to the bike frame during transporting.
2. When a consumer buys a bike packaged and opens the package box to take out the bike, there is no danger of the handle 4 and the brake lines or the speed changing lines falling onto the ground.
3. The handle is directly taken off to reduce the size of the package, thus eliminating the joint for bending the handle in a conventional collapsible bike, reducing the cost for packaging and transporting and simplifying the whole structure.
4. The handle 4 also stabilizes the front frame 1 when the handle 4 is tightened on the rear frame 2, as shown in Fig. 5, so the front frame 1 and the rear frame 2 cannot extend with the collapsing joint 3 during transporting or carrying.
5. The lengthwise straight ribs 431 on the outer wall of the longer side of the tightening member 43 significantly increase friction between the front fork tube 11 and the fix tube 21, thus ensuring that handle 4 will not fall off during transporting.